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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/027,726	12/21/2001	Daniel T. Colbert	11321-P011C1D8	2764
47744	7590	11/16/2004	EXAMINER	
ROSS SPENCER GARSSON			LISH, PETER J	
WINSTEAD SECHREST & MINICK P.C.				
P. O. BOX 50784			ART UNIT	
DALLAS, TX 75201			PAPER NUMBER	
			1754	

DATE MAILED: 11/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/027,726

Applicant(s)

COLBERT ET AL.

Examiner

Peter J Lish

Art Unit

1754

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 August 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 86-90, 94 and 95 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 89 is/are allowed.
- 6) ☒ Claim(s) 86-88, 90, and 94-95 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Arguments***

Applicant's arguments filed 8/16/04 have been fully considered but they are not persuasive.

Applicants argue, with regard to the rejection of claims 87-88, that the reference to Kiang teaches bundles of single-walled nanotubes (SWNTs) as opposed to the composite structures of the presently claimed invention. Applicants go on to argue that the bundles of Kiang are not inherently intertwined. However, the examiner does not rely upon the position that the bundles of Kiang are inherently intertwined. Rather, the reference to Dresselhaus is applied in order to further support the expectation that the SWNTs within a given bundle have a substantially uniform diameter. No difference is seen between the bundles of Kiang and the composite structures of claims 87-88. The bundles of nanotubes are seen in places to be made up of a plurality of carbon fibers, each comprising SWNTs in substantially parallel orientation. See for example Figure 2c of Kiang, where two bundles of SWNTs (or carbon fibers comprising SWNTs in parallel orientation) are seen to come together to form a composite fiber. Alternatively to the interaction between individual bundles of SWNTs meeting the limitations of claims 87-88, an individual bundle of SWNTs may also be seen to meet these limitations. For example, in a bundle containing 9 SWNTs every 3 SWNTS may be considered to make a "carbon fiber comprising SWNTs in parallel orientation", wherein the bundle can be considered to be a composite fiber.

Applicants argue, with regard to the rejection of claims 86-88 and 90, that contrary to examiners understanding a rejection under 102/103 is the same as making a

Art Unit: 1754

rejection under both 102 and 103 individually and that the rejection of the examiner therefore relies upon inherency. The examiner maintains his position that this is not the case. Examples of circumstances where a rejection under 102/103 may be used are as follows:

- b. When the reference discloses all the limitations of a claim except a property or function, and the examiner cannot determine whether or not the reference inherently possesses properties which anticipate or render obvious the claimed invention but has basis for shifting the burden of proof to applicant as in In re Fitzgerald, 619 F.2d 67, 205 USPQ 594 (CCPA 1980). See MPEP § § 2112- 2112.02.*

Dresselhaus et al. is relied upon to show that bundles of SWNTs having substantially uniform diameter (about 1.4 nm) are produced using arc-discharge processes. The bundles of Kiang shown in Fig. 2 and produced by an arc discharge process appear to have substantially uniform diameter. Additionally, Fig 5 a, b of Kiang shows SWNTs produced by arc-discharge that have substantially uniform diameters.

Applicants argue that Dresselhaus does not prove, without a doubt, that the nanotubes of Kiang inherently have the claimed properties. The examiner agrees and notes that if this were the case, than a 102 rejection alone would be proper. The combination of the teachings of Kiang and the fact that arc-discharge processes are known to produce SWNTs with substantially uniform diameter leads the examiner to reasonably expect the bundles of Kiang to contain SWNTs of which a substantial portion inherently possess the property of uniform diameter. As the examiner is not capable of producing or testing the bundles of Kiang, the burden of proof is shifted to the applicants.

The applicants, contrary to their arguments, have not shown evidence that the SWNT bundles of Kiang do not meet the claimed property. The applicants have pointed to the document "Diameter Doubling of Single Wall Nanotubes" to show that nanotubes within a bundle may have substantially different diameters. However, it is noted that the bundles examined in this document are specifically treated, after their synthesis, to make bundles of tubes with different diameters. These additional treatments are not performed in the synthesis process of Kiang and the relevance of this document is thus not seen. Rather, it would appear that this document further suggests that a substantially uniform diameter exists (see Fig. 1a) after synthesis and additionally that a majority of tubes have a homogenous helicity.

***Claim Rejections - 35 USC § 102/103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 86-88, 90, and 94-95 are rejected under 35 U.S.C. 102(a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kiang et al. ("Carbon Nanotubes With Single-Layer Walls") with Dresselhaus et al. (Carbon Nanotubes: Synthesis, Structure, Properties, and Applications) to show a state of fact.

Kiang teaches that single-walled nanotubes, made by the arc-discharge process, tend to aggregate into bundles. The nanotubes in a bundle run substantially parallel to one another and appear to have uniform diameters (see Figure 2c). Dresselhaus et al. teach that the nanotube material produced by either laser vaporization or the arc-discharge process appears as a mat of carbon bundles or ropes, such as those taught by Kiang et al. The single-walled nanotubes are

arrayed in bundles aligned along a common axis; the bundles are then intertwined to form “ropes” (page 6). Additionally Dresselhaus et al. teaches that the bundles produced by the vaporization and the arc-discharge processes contain nearly perfect single-wall nanotubes of substantially uniform diameter (page 73). Therefore, it is expected that the bundled single-walled nanotubes of Kiang et al. have a substantially uniform diameter.

Regarding claims 87-88, no difference is seen between the bundles and ropes of single-walled nanotubes of Kiang et al. and the “cable-like” fibers formed from carbon fibers, each of which comprises single-walled nanotubes in a parallel orientation.

Regarding claim 86, it is not explicitly taught that the individual single-walled nanotubes in a bundle have homogenous lengths or helicities in any given region of the bundle. However, it is expected that at least two adjacent tubes will have the same helicity or the same length due to corresponding growth conditions. Thus it is expected that a region of a nanotube bundle have a homogenous length or helicity in addition to the substantially homogenous diameter, which property is shared by the entire bundle. These regions are expected to occur along the axis of the bundle, as in the case of regions of homogenous length, or along a cross-section of the fiber, as in the case of homogenous helicity or diameter.

Regarding claim 90, it is not explicitly taught that the bundles of single-walled nanotubes may contain a portion that is not parallel. However, Kiang observes a large bundle that splits into sub-bundles (Fig. 2c), which are not parallel to each other.

***Allowable Subject Matter***

Claim 89 is allowed.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter J Lish whose telephone number is 571-272-1354. The examiner can normally be reached on 9:00-6:00 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 571-272-1358. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



PL

STUART L. HENDRICKSON  
PRIMARY EXAMINER